Results of Testing

Chemical Name	CAS No.	Study Code/Type	Protocol/Guideline	Species	Exposure	Dose/Concentration	No. per Group	Results	Reference
1,4-Dichloro-benzene (*para*-DCB)	106-46-7	HERTOXTERE 2-Generation reproduction study	40 CFR 798.4700 (modified))	rat	inhalation, 6 hr/d, 7 d/wk, 10 wks prior to mating and during the 3-wk mating, gestation (except females days 0-4), and lactation periods	0, 50, 150, 400 ppm	28/sex/group	Adults from the F0 and F1 generation had decreased gestational body weight gain (females only), lactational body weight gain (F1 only) and litter size in the high-exposure groups. Males from the F0 and F1 generation had decreased brain and testes weight in the high-exposure group. Histopathological effects of the liver were observed in the high-exposure adults of the F0 and F1 generation. Histopathological effects of the kidney were observed in the adults of the F0 (high-exposure) and F1 (males at all exposure groups) generation. F1 (during lactation) and F2 pups from the high-exposure group had increased mortality rates and decreased body weights.	OTS0523028
Chlorobenzene (Monochloro-benzene)	108-90-7	HEGTOXDNAF Unscheduled DNA synthesis (Voluntary test)	Non-TSCA Protocol/ Guideline (see docket# OPPTS-47002F)	rat	*in vitro*	10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 1.0% (v/v)	Not specified	Chlorobenzene did not induce DNA repair at any concentration. Cytotoxicity was observed in cultures exposed to 10^{-1} to 1% of MCB. The test material was not genotoxic in this study.	49 FR 18779; 5/2/84 OTS0511367
Chlorobenzene (Monochloro-benzene)	108-90-7	HERTOXTERE 2-Generation repro-duction study	40 CFR 798.4700 (modified)	rat	inhalation, 6 hr/d, 10 weeks	50, 150, 450 ppm	30 male; 30 female	No mortality occurred among the control or treated test animals in either of the adult generations. In the low-dose group, no adverse effects of treatment were evident in the F_0 or F_1 generations. In the mid- and high-dose groups, mean liver weights were higher than the control, particularly in the males. Microscopic examination of the F_0 and F_1 adults revealed hepatocellular hypertrophy, renal degeneration, and inflammatory lesions (both male and female). Mid- and high-dose males exhibited an increased incidence of testicular degenerative changes (unilateral or bilateral).	52 FR 2152; 1/20/87 OTS0511472
1,2,4-Trichloro-benzene	120-82-1	EEATOX Mysid shrimp acute toxicity	40 CFR 797.1930	Mysid shrimp	96 hr, flow-through	0.19, 0.28, 0.42, 0.60, 0.99 mg/L (measured)	20 (10/replicate)	At the highest concentration, 100% mortality was observed for the test material 1,2,4-TCB. The LC_{50} value (and 95% confidence limit) was 0.49 mg/L (0.43 to 0.56 mg/L). The no-observed-effect concentration was 0.19 mg/L.	53 FR 33537; 8/31/88 OTS0523008
1,2,4-Trichloro-benzene	120-82-1	EECTOX Mysid shrimp chronic toxicity	40 CFR 797.1950	Mysid shrimp	28 d, flow-through	0.013, 0.033, 0.064, 0.12, 0.28 mg/L (measured)	60/ concentration	Survival among high-dose F_0 animals exposed to 1,2,4-TCB was 32%, (which was significantly less than the survival of the F_0 test animals observed in the remaining 4 test concentrations). Concentration-related effects on growth (both generations) and reproduction (F^0) were noted. The MATC (based on reproduction) was estimated to be $\leq$ 0.064 mg/L and $\geq$ 0.033 mg/L.	53 FR 33537; 8/31/88 OTS0523008

Chemical Name	CAS No.	Study Code/Type	Protocol/Guideline	Species	Exposure	Dose/Concentration	No. per Group	Results	Reference
1,2,4-Trichloro-benzene	120-82-1	HECTOXCARC Oncogenicity study	40 CFR 798.3300 (modified)	rat	diet, 104 weeks	100, 350, 1200 ppm	50/sex	The 1200 ppm dietary concentration a produced significant decrease in survival of the males at week 104, hepatocellular hypertrophy, diffuse fatty change in the liver, hepatic focal cystic degeneration, significantly increased mean absolute liver weight and mean liver-to-terminal-body-weight ratio, and significantly increased mean liver-to-brain-weight ratio in males. Findings at necropsy included enlarged livers, transitional cell hyperplasia of the renal pelvic urothelium, and chronic progressive nephropathy in males in the 1200 ppm group. Renal pelvis mineralization and granular, pitted, and rough appearance of the kidneys were observed in males and females in the 1200 ppm group. The 100 and 350 ppm dietary concentrations produced no treatment-related effects. The NOEL for systemic toxicity was 350 ppm.	59 FR 38472; 7/28/94, Docket# OPPTS-44612
1,2,4-Trichloro-benzene	120-82-1	HECTOXCARC Oncogenicity study	40 CFR 798.3300 (modified)	mouse	diet, 104 weeks	150, 700, 3200 ppm	50/sex	Dietary concentrations of 150, 700, and 3200 ppm produced treatment-related effects such as distended abdomen and increased mean liver weight. Liver masses, hepatocellular carcinomas, heptocellular adenomas, and centrilobular hepatocytomegaly were evident in animals treated in the 700 and 3200 ppm groups. A significant decrease in survival at week 104 was observed in the 3200 ppm group; no females survived to study termination in the 3200 ppm group.	59 FR 38472; 7/28/94, Docket# OPPTS-44612
1,2,4-Trichloro-benzene	120-82-1	HEGTOXDNAF Unscheduled DNA synthesis (Voluntary test)	Non-TSCA Protocol/ Guideline (see docket# OPPTS-47002F)	rat	*in vitro*	10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 1.0% (v/v)	Not specified	1,2,4-Trichlorobenzene did not induce DNA repair at any concentration. Cytotoxicity was observed in cultures exposed to 10^{-2} to 1% of TCB. The test material was not genotoxic in this study.	49 FR 18779; 5/2/84 OTS0511367
1,2,3-Trichloro-benzene	87-61-6	EEATOX Mysid shrimp acute toxicity	40 CFR 797.1950	Mysid shrimp	96 hr, flow-through	0.12, 0.13, 0.21, 0.35, 0.57 mg/L (measured)	20 (10/replicate)	Of the test animals exposed to 0.57 mg/L of test material (1,2,3-TCB), only 15% survived. The LC_{50} value (and 95% confidence interval) was 0.35 mg/L (0.30 to 0.42 mg/L). The no-observed-effect concentrations was 0.21 mg/L.	53 FR 33537; 8/31/88 OTS0523008
1,2,3-Trichloro-benzene	87-61-6	EEATOX Acute fish toxicity	40 CFR 797.1400	Atlantic silverside	96 hr, flow-through	0.53, 0.83, 1.3, 1.9, 2.8 mg/L (measured)	20 (10/replicate)	At the 2 highest test concentrations of 1,2,3-trichlorobenzene (1,2,3-TCB), 100% mortality was observed, and 25% mortality was noted at 1.3 mg/L. The remaining concentration produced 0% mortality. The LC_{50} value (and 95% confidence level) was 1.4 mg/L (1.3 to 1.9 mg/L). The no-observed-effect concentration was less than 0.53 mg/L.	53 FR 33537; 8/31/88 OTS0523008
1,2,3-Trichloro-benzene	87-61-6	EEATOX Acute fish toxicity	40 CFR 797.1400	Fathead minnow	96 hr, flow-through	0.069, 0.96, 1.5, 2.2, 3.5 mg/L (measured)	20 (10/replicate)	Total mortality was observed at the highest concentration of the test material, 1,2,3-trichlorobenzene, and 30% mortality at the 2.2 mg/L level. The remaining concentrations had 0% mortality. The LC_{50} value (and 95% confidence interval) was 2.4 mg/L (1.5 to 3.5 mg/L). The no-observed-effect concentration was 0.69 mg/L.	53 FR 33537; 8/31/88 OTS0523008

Chemical Name	CAS No.	Study Code/Type	Protocol/Guideline	Species	Exposure	Dose/Concentration	No. per Group	Results	Reference
1,2,3-Trichloro-benzene	87-61-6	EEATOX Acute aquatic toxicity, crustacean	40 CFR 797.1310	Gammarids	96 hr, flow-through	0.31, 0.47, 0.60, 1.0, 1.4 mg/L (measured)	20 (10/replicate)	At 96 hours, 100% mortality was observed in the highest test concentration of 1,2,3-TCB (1.4 mg/L). Mortality in the remaining treatment levels ranged from 0 to 25%. Lethargy was observed at all concentrations. The LC_{50} value (and 95% confidence limit) were 1.1 mg/L (1.0 to 1.4 mg/L).	53 FR 43267; 10/26/88 OTS0523009
1,2,3-Trichloro-benzene	87-61-6	EECTOX Mysid shrimp chronic toxicity	40 CFR 797.1950	Mysid shrimp	28 d, flow-through	0.017 - 0.26 mg/L (measured)	60/ concentration (30/replicate)	No effects on survival of the parent generation were seen at any test concentration. Reproduction was totally inhibited at the high concentration.	53 FR 49227; 12/6/88 OTS0523010
1,2-Dichloro-benzene (*ortho*-DCB)	95-50-1	EFADEGHYDR Hydrolysis study	Non-TSCA Protocol/ Guideline (see docket# OPPTS-47002F)	Not applicable	pH 3, 7, 11; 25 °C	Not specified	Not applicable	Rate constants of 1,2-dichlorobenzene for pH 3, 7, and 11 were 0.0195, 0.0196, and 0.0153/day, respectively; half-lives at the same pH levels were 35.5, 35.4, and 45.4 days, respectively.	54 FR 21282; 5/17/89 OTS0526333
1,2-Dichloro-benzene (*ortho*-DCB)	95-50-1	HEGTOXDNAF Unscheduled DNA synthesis (Voluntary test)	Non-TSCA Protocol/ Guideline (see docket# OPPTS-47002F)	rat	*in vitro*	10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 1.0% (v/v)	Not specified	1,2-Dichlorobenzene did not induce DNA repair at any concentration. Cytotoxicity was observed in cultures exposed to 10^{-2} to 1% of DCB. The test material was not genotoxic in this study.	49 FR 18779; 5/2/84 OTS0511367
1,2-Dichloro-benzene (*ortho*-DCB)	95-50-1	HERTOXTERE 2-Generation reproduction study	40 CFR 798.4700 (modified))	rat	inhalation, 6 hr/d, 7 d/wk, 10 wks prior to mating and during the 3-wk mating, gestation (except females days 0-4), and lactation periods	0, 50, 150, 400 ppm	30/sex/group	Histopathological effects were observed in the F0 and F1 generation in the liver (mid- and high exposure male and females) and kidney (mid- and high exposure males). No adverse effects were observed in any treated rat with respect to reproductive performance, fertility indices, gestational or lactation weight gain, litter size, or pup survival indices.	OTS0523028
1,2,4,5-Tetrachloro-benzene	95-94-3	EFADEGHYDR Hydrolysis study	Non-TSCA Protocol/ Guideline (see docket# OPPTS-42050A)	Not applicable	pH 3, 7, 11; 25 °C	Not specified	Not applicable	The rate constants of 1,2,4,5-tetrachlorobenzene for pH 3, 7, and 11 were 0.0157, 0.0142, and 0.0165/day, respectively; half-lives at the same pH levels were 44.2, 48.9, and 42.days, respectively.	54 FR 21282; 5/17/89 OTS0526333
1,2,4,5-Tetrachloro-benzene	95-94-3	HERTOXTERA Developmental toxicity	40 CFR 798.4900 (modified)	rat	oral (gavage), gestation days 6-15	0, 25, 75, 125 mg/kg/d	25 mated females	Maternal toxicity (increased relative liver weight) was noted at 75 mg/kg/day, and decreased body weight gain and food intake at 125 mg/kg/day. Fetotoxicity (increased skeletal variations) occurred at all dose levels. No embryotoxicity or teratogenicity was noted at any treatment level. The maternal NOEL was 25 mg/kg/day.	53 FR 951; 1/14/88 OTS0523027
1,2,4,5-Tetrachloro-benzene	95-94-3	HERTOXTERA Developmental toxicity	40 CFR 798.4900 (modified)	rabbit	oral (gavage), gestation days 6-18	0, 5, 15, 25 mg/kg/d	15 bred females	Maternal toxicity (death; reduced body weight gain) occurred at all doses. Increased visceral and skeletal variations were noted at low and mid-dose levels. The NOEL for maternal and developmental toxicity was <5 mg/kg/day.	53 FR 951; 1/14/88 OTS0523027
1,2,4,5-Tetrachloro-benzene	95-94-3	HERTOXTERE 2-Generation reproduction study	40 CFR 798.4700 (modified))	rat	10 weeks, oral (dietary)	0, 30, 300, 1000 ppm	28 male; 28 female	Adult F_0 males exhibited reduced body weights, weight gains, and food consumption at 1000 ppm. F_0 males (1000 ppm) exhibited a significant increase in liver and kidney size as well as color changes in the lymph nodes. Females at the same dose level had color changes in the jejunum. Adult females (F_0) at 30 and 300 ppm exhibited occasional weight reductions. There were significant reductions in maternal gestational and lactational body weights at the high-dose level. The number of F_1 stillborn and postnatal deaths was increased at 300 and 1000 ppm.	54 FR 21282; 5/17/89 OTS0523029

G020
Chlorinated Benzenes

A P P E N D I X A

Chlorinated Benzenes

Chemical Name	CAS No.
Chlorobenzene (Monochlorobenzene, MCB)	108-90-7
Dichlorobenzene, 1,2- (*ortho*-DCB)	95-50-1
Dichlorobenzene, 1,4- (*para*-DCB)	106-46-7
Pentachlorobenzene	608-93-5
Tetrachlorobenzene, 1,2,4,5-	95-94-3
Tetrachlorobenzene, 1,2,3,5-	634-90-2
Tetrachlorobenzene, 1,2,3,4-	634-66-2
Trichlorobenzene, 1,2,4-	120-82-1
Trichlorobenzene, 1,2,3-	87-61-6

APPENDIX B

SUMMARY OF TESTING DECISIONS FOR CHLORINATED BENZENES

CHEMICAL	PRM HE 7/18/80	NTA/PRM HE 12/7/83	PRM/ANPR EE 1/13/84	PRM/DNT HE 12/28/84	FRM EE 4/7/86	FRM HE 7/8/86	DNT EE 7/24/86
MCB	Developmental Tox.	incl. in NTA	.....	withdrawn	.....	.....	.....
	Subchronic Tox.	incl. in NTA	.....	withdrawn	.....	.....	.....
	Reproduct. Effects	incl. in NTA	.....	required	.....	required	.....
	.....	.....	Chemical Fate	.....	withdrawn	.....	
	.....	.....	Environ. Effects	.....	withdrawn		
1,2-DCB & 1,4-DCB	Developmental Tox.	incl. in NTA	.....	withdrawn	.....	.....	.....
	Subchronic Tox.	incl. in NTA	.....	withdrawn	.....	.....	.....
	Reproduct. Effects	incl. in NTA	.....	required	.....	required	.....
	.....	.....	Chemical Fate	.....	required	.....	.....
	.....	.....	Environ. Effects	.....	withdrawn	.....	.....
1,2,4-TriCB	Oncogenicity	.....	.....	required	.....	required	.....
	Developmental Tox.	withdrawn	.....	withdrawn	.....	.....	.....
	Subchronic Tox.	withdrawn	.....	withdrawn	.....	.....	.....
	.....	.....	Chemical Fate	.....	required	.....	.....
	.....	.....	Environ. Effects	.....	required	.....	.....
1,2,3-TriCB	.....	.....	Chemical Fate	.....	withdrawn	.....	.....
	.....	.....	Environ. Effects	.....	required	.....	.....
1,2,4,5-TetraCB	Oncogenicity	.....	.....	required	.....	withdrawn	.....
	Developmental Tox.	.....	.....	required	.....	required	.....
	Subchronic Tox.	.....	.....	required	.....	withdrawn	.....
	.....	.....	Environ. Effects	.....	.....	.....	withdrawn
1,2,3,4- & 1,2,3,5-TetraCB	.....	.....	Environ. Effects	.....	.....	.....	withdrawn
PentaCB	Oncogenicity	withdrawn	.....	withdrawn	.....	.....	.....
	Reproduct. Effects	withdrawn	.....	withdrawn	.....	.....	.....